U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE
SUBCOMMITTEE ON ENVIRONMENT, TECHNOLOGY, AND STANDARDS

HEARING CHARTER

Testing and Certification for Voting Equipment: How Can These Processes Be Improved?

June 24, 2004
2:00 p.m. to 4:00 p.m.
2318 Rayburn House Office Building

Purpose:

On Thursday, June 24, 2004, the House Science Subcommittee on Environment, Technology, and Standards will hold a hearing to examine how voting equipment is tested against voting system standards and how the independent laboratories that test voting equipment are selected.

Each election season, a small number of newly deployed voting machines fail to perform properly in the field, causing confusion in the polling places and concerns over the potential loss of votes. Because these machines have already been tested and certified against standards, these incidents have raised questions about the reliability of the testing process, the credibility of standards against which the machines are tested, and the laboratories that carry out the tests. While most of the national attention on voting systems has been focused on the subjects of computer hacking and voter-verifiable paper ballots, press reports (see Appendix A) have also highlighted the problems of voting machine testing.

A focus of the hearing will be how the implementation of the Help America Vote Act (HAVA) is intended to improve the way voting machines are tested, the role of the National Institute of Standards and Technology (NIST), and what changes can be implemented in time for the 2004 election and beyond.

Witnesses:

Dr. Hratch Semerjian – Acting Director, National Institute of Standards and Technology (NIST).

Mr. Tom Wilkey – Chair of the National Association of State Elections Directors (NASED) Independent Testing Authority (ITA) Committee. He is the former Executive Director of the New York State Board of Elections.

Ms. Carolyn Coggins – Director of Independent Testing Authority Services for SysTest Laboratories, a Denver laboratory that tests software used in voting machines.

Dr. Michael Shamos – Professor of Computer Science at Carnegie Mellon University. He has served as an Examiner of Electronic Voting Systems for Pennsylvania.

Overarching Questions:

The subcommittee plans to explore the following questions:

- How are the accreditation of testing laboratories and the testing and certification of voting equipment conducted?

- How should voting equipment standards and laboratory testing be changed to improve the quality of voting equipment and ensure greater trust and confidence in voting systems?

- What can be done to improve these processes before the 2004 election, and what needs to be done to finish these improvements by 2006?

Background:

Introduction

In October 2002, Congress passed the Help America Vote Act (HAVA) to help correct the problems with voting machines that were brought to the public's attention during the 2000 Federal election. Under HAVA, the States are receiving $2.3 billion in fiscal 2004 to purchase new voting equipment. To try to encourage and enable states to buy effective voting equipment, HAVA reformed the way standards for voting machines are developed and the way voting machines are tested against those standards. However, HAVA does not require any state or manufacturer to abide by the standards.

Before the passage of the Help America Vote Act (HAVA), the Federal Election Commission (FEC) established voting system standards. A non-governmental group of state elections directors (the National Association of State Elections Directors, or NASED) accredited the laboratories, also known as Independent Testing Authorities (ITAs), which then tested whether voting systems met the standards. With the passage of HAVA, the responsibility for issuing voting system standards and for accrediting the ITAs was transferred to the Election Assistance Commission (EAC). Under HAVA, the EAC is to select ITAs based on the recommendations of the National Institute of Standards and Technology (NIST). For more information on HAVA, see Appendix B.

The transition to the new standards regime, however, has been slow. Members of the EAC were appointed at the end of 2003. Congress provided little funding this year to the EAC and none at all to NIST to begin to carry out its duties under HAVA. (At the Science Committee's instigation, the Administration was able to find $350,000 for NIST to carry out some of the most urgently needed work.) As a result, the current testing regime is essentially identical to that which existed before Congress passed HAVA.

The FEC Testing Regime

The standards used today were first issued by the FEC in 1990 and last updated in 2002. Those standards, known as the Voting System Standard (VSS), deal with performance, security, and other aspects of voting systems have existed since 1990. The FEC developed the standards on a limited budget with input from NASED, voting experts, manufacturers, and interest groups, such as the disabled and the League of Women Voters, many of whom participated on a volunteer basis. Although no federal mandate requires that the standards be used, some States have adopted them as mandatory requirements.

To qualify voting machines under the FEC standards, manufacturers must send their equipment to a NASED-approved laboratory (ITA) for testing and inspection. There are three ITAs: Wyle Laboratories, which tests hardware; and CIBER and SysTest laboratories, which test software.

Prior to HAVA, the federal government had no official role in approving ITAs. The FEC did cooperate informally with NASED to identify laboratories that could become ITAs. However, few laboratories were willing to participate because they viewed voting machine certification as a risky venture that was unlikely to generate much revenue.

Once a voting machine or its software has passed the current testing process, it is added to the NASED list of "Qualified" voting systems, which means they have met the FEC standards. The only publicly available information is whether a particular machine has passed testing; the complete tests results are not made public because they are considered proprietary information.

Voting technology experts have raised a number of concerns about the standards and testing under the FEC system. They include:

- Some of the FEC Voting System Standards are descriptive rather than quantitative, making it more difficult to measure compliance.
- Many of the FEC Voting System Standards are described very generally, for example those for security. Although this avoids dictating specific technologies to the manufacturers, the standards may require more specificity to be meaningful and effective.
- The ITAs do not necessarily test the same things in the same way so a test for a specific aspect of computer security in one lab may not be the same test used in another.
- Hardware and software laboratories do not necessarily know each other's testing procedures, and although communication takes place between them, they are not required to integrate or coordinate their tests.
- The ITAs, once chosen, are not regularly reviewed for performance. Reaccreditation would help ensure that quality and expertise did not decline or otherwise change over time, and that any new testing protocols were being carried out appropriately.
- Few States effectively test voting machines once they are delivered even though ITA testing – like most product testing – tests samples rather than every unit of a product. When Georgia, in association with Kennesaw State University, conducted their own independent test of their new machines, the state sent 5 percent of them back to the manufacturer for various defects.

- Companies offer, and States install, last-minute software "patches" that have not been subjected to any testing. California recently decertified new voting machines because they included untested software patches.
- The small number of ITAs limits the amount of competition on the basis of either price or quality.
- As is the case in most product testing, manufacturers, rather than disinterested third parties, pay for the testing.

The Pending NIST Testing Regime

To fully implement HAVA, NIST will have to develop, and the EAC will have to approve standards that the voting equipment must meet (to replace the FEC Voting Systems Standards); tests to determine whether voting equipment complies with those standards; and tests to determine whether laboratories are qualified to become ITAs. NIST has begun preliminary work on some of these tasks, but has been constrained by scarce funds.

Under HAVA, NIST is also to conduct an evaluation of any laboratory that wishes to become an ITA (including ITAs that were already accredited under the NASED system). Accreditation would then be granted by the EAC based on NIST's recommendations. HAVA also requires NIST to monitor the performance of the ITAs, including, if necessary, recommending that the EAC revoke an ITA's accreditation. (These provisions of HAVA originated in the House Science Committee.)

NIST has not yet begun to implement this aspect of HAVA, but NIST recently announced that it will soon convene a meeting for those laboratories that are interested in becoming ITAs to discuss what qualifications they must meet.

Since NIST has just begun developing lab accreditation standards, as an interim measure, NIST will probably accredit laboratories as ITAs using a generic, international standard for laboratories, known as ISO 17025. NIST uses that standard already as part of its existing program for certifying laboratories for other purposes, known as the National Voluntary Laboratory Accreditation Program (NVLAP).

Obviously, none of this will be done in time to affect the purchase of equipment for the 2004 elections, and many States are making large purchases of voting equipment now with the money available under HAVA. However, a number of large States have not yet purchased equipment partly because of uncertainty about what the new standards will be.

Limitations of Laboratory Testing in Reducing Errors in Voting Equipment

An improved federal certification process is a necessary, but not sufficient condition for improving the performance of voting equipment. According to experts, among the issues that remain are:

- No one is required to abide by the new system, although presumably States will want to buy equipment that meets the EAC standards and has been tested in federally certified ITAs.
- Laboratories cannot test every situation that may arise in the actual use of voting machines. Election experts say States should do their own testing, including simulated elections. Some States, for example Georgia, California, and Florida, are implementing tests of their own.
- Pollworker training and voter education are critical to reducing human error and resulting problems with voting equipment. Technology that works perfectly can still be confusing to the users.

WITNESS QUESTIONS

In their letters of invitation, the witnesses were asked to respond to the following questions:

Questions for Dr. Semerjian:

1. How should the accreditation of testing laboratories and the testing and certification of voting equipment be changed to improve the quality of voting equipment and ensure greater trust and confidence in voting systems?

2. What can be done to improve these processes before the 2004 election, and what needs to be done to finish these improvements by 2006? Do enough Independent Testing Authorities exist to carry out the needed tests? If not, what can be done to increase the number of laboratories?

3. What progress has NIST made in carrying out the requirements of the Help America Vote Act?

Questions for Mr. Wilkey:

1. How should the accreditation of testing laboratories and the testing and certification of voting equipment be changed to improve the quality of voting equipment and ensure greater trust and confidence in voting systems?

2. What can be done to improve these processes before the 2004 election, and what needs to be done to finish these improvements by 2006?

3. Do enough Independent Testing Authorities exist to carry out the needed tests? If not, what can be done to increase the number of laboratories?

Questions for Ms. Coggins:

1.   How should the accreditation of testing laboratories and the testing and certification of voting equipment be changed to improve the quality of voting equipment and ensure greater trust and confidence in voting systems?

2.   What can be done to improve these processes before the 2004 election, and what needs to be done to finish these improvements by 2006?

3.   How do standards affect the way you test voting equipment?

Questions for Dr. Shamos:

1.   How should the accreditation of testing laboratories and the testing and certification of voting equipment be changed to improve the quality of voting equipment and ensure greater trust and confidence in voting systems?

2.   What can be done to improve these processes before the 2004 election, and what needs to be done to finish these improvements by 2006?

3.   How important is NIST's role in improving the way voting equipment is tested? What activities should States be undertaking to ensure voting equipment works properly?

APPENDIX A

Who Tests Voting Machines?

New York Times Editorial
May 30, 2004

Whenever questions are raised about the reliability of electronic voting machines, election officials have a ready response: independent testing. There is nothing to worry about, they insist, because the software has been painstakingly reviewed by independent testing authorities to make sure it is accurate and honest, and then certified by state election officials. But this process is riddled with problems, including conflicts of interest and a disturbing lack of transparency. Voters should demand reform, and they should also keep demanding, as a growing number of Americans are, a voter-verified paper record of their vote.

Experts have been warning that electronic voting in its current form cannot be trusted. There is a real danger that elections could be stolen by nefarious computer code, or that accidental errors could change an election's outcome. But state officials invariably say that the machines are tested by federally selected laboratories. The League of Women Voters, in a paper dismissing calls for voter-verified paper trails, puts its faith in "the certification and standards process."

But there is, to begin with, a stunning lack of transparency surrounding this process. Voters have a right to know how voting machine testing is done. Testing companies disagree, routinely denying government officials and the public basic information. Kevin Shelley, the California secretary of state, could not get two companies testing his state's machines to answer even basic questions. One of them, Wyle Laboratories, refused to tell us anything about how it tests, or about its testers' credentials. "We don't discuss our voting machine work," said Dan Reeder, a Wyle spokesman.

Although they are called independent, these labs are selected and paid by the voting machine companies, not by the government. They can come under enormous pressure to do reviews quickly, and not to find problems, which slow things down and create additional costs. Brian Phillips, president of SysTest Labs, one of three companies that review voting machines, conceded, "There's going to be the risk of a conflict of interest when you are being paid by the vendor that you are qualifying product for."

It is difficult to determine what, precisely, the labs do. To ensure there are no flaws in the software, every line should be scrutinized, but it is hard to believe this is being done for voting software, which can contain more than a million lines. Dr. David Dill, a professor of computer science at Stanford University, calls it "basically an impossible task," and doubts it is occurring. In any case, he says, "there is no technology that can find all of the bugs and malicious things in software."

The testing authorities are currently working off 2002 standards that computer experts say are inadequate. One glaring flaw, notes Rebecca Mercuri, a Harvard-affiliated computer scientist, is that the standards do not require examination of any commercial, off-the-shelf software used in voting machines, even though it can contain flaws that put the integrity of the whole system in

doubt. A study of Maryland's voting machines earlier this year found that they used Microsoft software that lacked critical security updates, including one to stop remote attackers from taking over the machine.

If so-called independent testing were as effective as its supporters claim, the certified software should work flawlessly. But there have been disturbing malfunctions. Software that will be used in Miami-Dade County, Fla., this year was found to have a troubling error: when it performed an audit of all of the votes cast, it failed to correctly match voting machines to their corresponding vote totals.

If independent testing were taken seriously, there would be an absolute bar on using untested and uncertified software. But when it is expedient, manufacturers and election officials toss aside the rules without telling the voters. In California, a state audit found that voters in 17 counties cast votes last fall on machines with uncertified software. When Georgia's new voting machines were not working weeks before the 2002 election, uncertified software that was not approved by any laboratory was added to every machine in the state.

The system requires a complete overhaul. The Election Assistance Commission, a newly created federal body, has begun a review, but it has been slow to start, and it is hamstrung by inadequate finances. The commission should move rapidly to require a system that includes:

Truly independent laboratories. Government, not the voting machine companies, must pay for the testing and oversee it.

Transparency. Voters should be told how testing is being done, and the testers' qualifications.

Rigorous standards. These should spell out in detail how software and hardware are to be tested, and fix deficiencies computer experts have found.

Tough penalties for violations. Voting machine companies and election officials who try to pass off uncertified software and hardware as certified should face civil and criminal penalties.

Mandatory backups. Since it is extremely difficult to know that electronic voting machines will be certified and functional on Election Day, election officials should be required to have a nonelectronic system available for use.

None of these are substitutes for the best protection of all: a voter-verified paper record, either a printed receipt that voters can see (but not take with them) for touch-screen machines, or the ballot itself for optical scan machines. These create a hard record of people's votes that can be compared to the machine totals to make sure the counts are honest. It is unlikely testing and certification will ever be a complete answer to concerns about electronic voting, but they certainly are not now.

APPENDIX B

The Help America Vote Act (HAVA)

In 2002, the President signed the Help America Vote Act (HAVA) into law, which included a number of measures intended to improve the U.S. election system. Among other things, HAVA banned the use of punch card and lever voting machines and provided funds to the States to replace them. It established an Election Assistance Commission (EAC) to assist in the administration of Federal elections and the administration of certain Federal election laws and programs, and otherwise oversee the reforms recommended under HAVA. HAVA also established a number of basic requirements that voting machines and systems should meet, and a process by which new voluntary technical standards could be developed to ensure the reliability and accuracy of new voting equipment.

The Science Committee included provisions in HAVA that designated the Director of the National Institute of Standards and Technology (NIST) to chair the Technical Guidelines Development Committee (TGDC), a 14-member panel charged with the development of voluntary voting system guidelines, or standards. HAVA also created a 110-member Standards Board consisting of state and local election officials, and a 37-member Board of Advisors consisting of representatives from various associations, who together would review the standards recommended by the TGDC. The EAC was given the final word on whether these standards would be officially adopted. Once adopted, it would still be up to the States to determine whether the equipment they bought needed to meet the standards, since they are meant to be voluntary, not coercive.